



AAM Community Integration Working Group Kickoff

Questions and Answers:

Conference.io

Web Address:

<https://arc.cnf.io/sessions/t5am/#!/dashboard>



AAM Community Integration Working Group Kickoff Agenda

CIWG KickOff (30 minutes)

Welcome

Introduction NASA WG Lead

UAM Ecosystem

High-level overview of Community Integration WG (CIWG)
content/roadmap

Discuss path forward for WG and Subgroups

WG Logistics

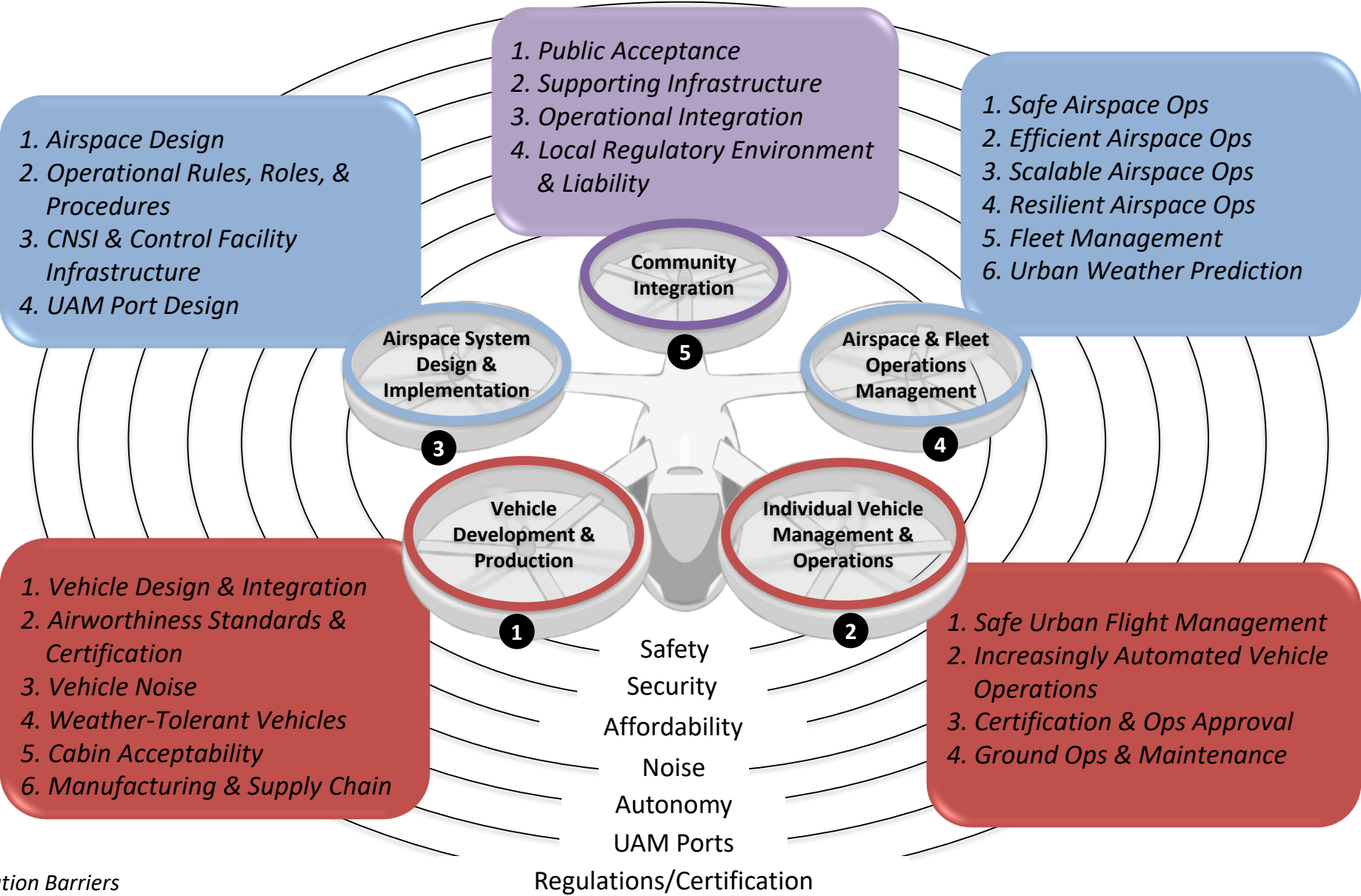
Panel Discussion, including Q&A (1:20 minutes)

Closing (10 minutes)

Development & Production	Management & Ops	& Implementation	Operations Management	Local/National	National/International
Government: FAA/AIR, DoD Standards: ASTM, RTCA, SAE, EUROCAE, ICAO	Government: FAA/AIR/AFS Standards: ASTM, RTCA, SAE, EUROCAE, ICAO	Government: FAA/AIR/ATO Standards: RTCA, ICAO	Government: FAA/ATO, DOC, DoD, DHS Standards: RTCA, ICAO	Decision Makers <ul style="list-style-type: none">Mayors/City Councils/Boards of SupervisorsTribal CouncilsDepartments of TransportationNational League of Cities (2000+ cities, 49 states with additional cities)Port Authority (of various big cities)US Conference of MayorsNational Governors AssociationEuropean Aviation Safety Agency (EASA) (Europe)European Organization for Civil Aviation Equipment (EUROCAE) (Europe)	Decision Makers <ul style="list-style-type: none">US CongressDOT/FAA – AIR, AFS, ATODOC/NTIA (public/federal spectrum)FCC (commercial spectrum)DHSDOJ/FBI
Aircraft Developers <ul style="list-style-type: none">AeroVironmentAirspaceX/MobiAlakia TechnologyAmpaireApex UnmannedASXBellBoeing/AuroraBoeing/HorizonXCarter AviationElroy AirEsaAeroFanFlyerGeneral AtomicsGoogle XHap CarHi-Lite AircraftIntel venturesJetopteraJobyKarmen.AeroKittyhawkPiaseckiOpenerRobodubSikorsky	Integrated Automation & Aircraft Operations <ul style="list-style-type: none">AutonodyneBell HelicopterBoeing/Aurora/JeppesonCavan SolutionsEvo-LuzJobyKittyhawkMosaic ATMNodelin RoboticsPlank AerosystemsSikorskyUberVerizon/SkywardXwingZaphodA3 (I)Drone Employee (I)Skyy Network (I)Terafugia (I)Third Space Auto (I)	Airspace Design <ul style="list-style-type: none">AGIAirmapANRACrownGE/AiROXSHarrisLockheedM2C AerospaceMetronMITRESkywardXAirSkyA3 (I)	Traditional ATM Suppliers <ul style="list-style-type: none">ATAC CorporationGE/AiROXSGeneral DynamicsHarrisJet Blue Tech VentLockheedM2C AerospaceMicrosoftNeXt (Boeing)SparkCognitionPASSUR AerospaceRaytheonRockwellThales (I)		
		Flight Procedures Development <ul style="list-style-type: none">Boeing/JeppesonHughes AerospaceLeidosWolf UASGlobal Airspace Solutions (I)	UAM ATM Providers <ul style="list-style-type: none">AirMapAGI (OneSky)ANRA TechnologiesCACI TechnologiesGE/AiRXOSSkyward/VerizonSimulyzeUber ElevateUTRCUAS SidekickWSIUnify (I)ATECH S/A (I)		
		Vertiport Design <ul style="list-style-type: none">Burns and McDonnellGannette FlemingHeliExpertsNear earth autonomyUber ElevateWSP	Data Service Suppliers <ul style="list-style-type: none">ClimacellSabreStellar LabsTruWeatherXM WX	Influencers <ul style="list-style-type: none">Chambers of CommerceEurocontrol (Europe)FAA/IPP: Choctaw, San Diego, IEIA (VA), KS DoT, Ft Myers (FL), Memphis Airport (TN), NC DoT, ND DoT, Reno (NV), UAF (Fairbanks, AK)Uber	Influencers (Domestic) <ul style="list-style-type: none">American Association of Airport Executives (AAAE)American Institute of Aeronautics and Astronautics (AIAA)American Insurance AssociationAircraft Owners and Pilots Assoc (AOPA)Association of Air Medical ServicesCommercial Drone AllianceCoalition of UAS ProfessionalsEnvironmental Groups (e.g. Sierra Club)Experimental Aircraft Association (EAA)NASANational Academies-Transportation Research BoardNational Institutes of Standards and Technologies (NIST)/Smart CitiesNational Transportation Safety Board (NTSB)Vertical Flight Society (AHS)
Subsystems: Airframe & Propulsion <ul style="list-style-type: none">ES AeroGE AviationLaunchPointMAGicALLS-RAM DynamicsThin GapUnited TechnologiesEmrax (I)Rolls Royce (I)Siemens (I)Safan (I)	Subsystems: Flight Automation <ul style="list-style-type: none">Aspen AvionicsAvidyne CorporationDynon AvionicsEchodyneGarminGE Aviation SystemsGenesys AerosystemsHoneywell/Bendix KingIris AutomationNear Earth AutonomyRockwell CollinsSandel AvionicsTruTrak Flight SystemsUTRCBAE (I)	Subsystems: CNS <ul style="list-style-type: none">ARINCAstronauticsAT&TCirconiaClear-ComEchodyneFortemGE AviationGogoGryphon/SRCHigher groundHoneywellL3/ACUSNextNavPrimal SystemsR3RaytheonSageTechSARASierra NevadaSmartSky NetworksSkywardTTTechUTRCVerizonXWingBAE Systems (I)ParaZero (I)RADA Sensor (I)Thales (I)	Fleet Operations <ul style="list-style-type: none">AGIAmazon Prime AirBlade HelicopterBoeing/Horizon XBoeing/JeppesenDrop DroneFedExIBMKittyHawkKugelair Flight SvcPersonal Airline ExchangeSkyward/VerizonSustain Avia FoundUber ElevateA3 (I)EmbraerX (I)Sumitomo Corp	Incubators/Investors <ul style="list-style-type: none">Defense Innovation Experimental (DUIx)StarburstStrategic Alliances Resources Network (StarNet)Sustainable Aviation Limited	Influencers (Interntional) <ul style="list-style-type: none">German Aerospace Center (DLR)International Forum for Aviation Research (IFAR)Japan Aerospace Exploration Agency (JAXA)Korea Aerospace Research Institute (KARI)Netherlands Aerospace Center (NLR)ONERA (French Aerospace Center)
Manufacturing <ul style="list-style-type: none">BoeingFordGM			UAM Range Test Sites <ul style="list-style-type: none">Arizona Commerce AuthorityChoctaw Nation (OK)Deseret UAS Test Site (UT)Kansas State UniversitySOAR UAS Test Site (OR)University of Maryland UAS Test SiteFAA Test Sites: Alaska Center for UAS Integration, Lone Star Center UAS of Excel and Innov, Mid-Atlantic Avia Partnership (VA), Nevada Institute for Autonomous Sys,		Influencers (Global) <ul style="list-style-type: none">Airports Council International (ACI)Association for Unmanned Vehicle Systems International (AUVSI)Civil Air Navigation Services Organization (CANSO) – ANSP providersEnvironmental (Greenpeace, WWF)General Aviation Manufactures Association (GAMA)International Air Transport Association (IATA) - AirlinesInternational Telecommunication Union (ITU) (I)
					(I) – International



UAM Framework and Barriers



- Vehicle Barriers
- Airspace Barriers
- Community Integration Barriers
- # Pillar number

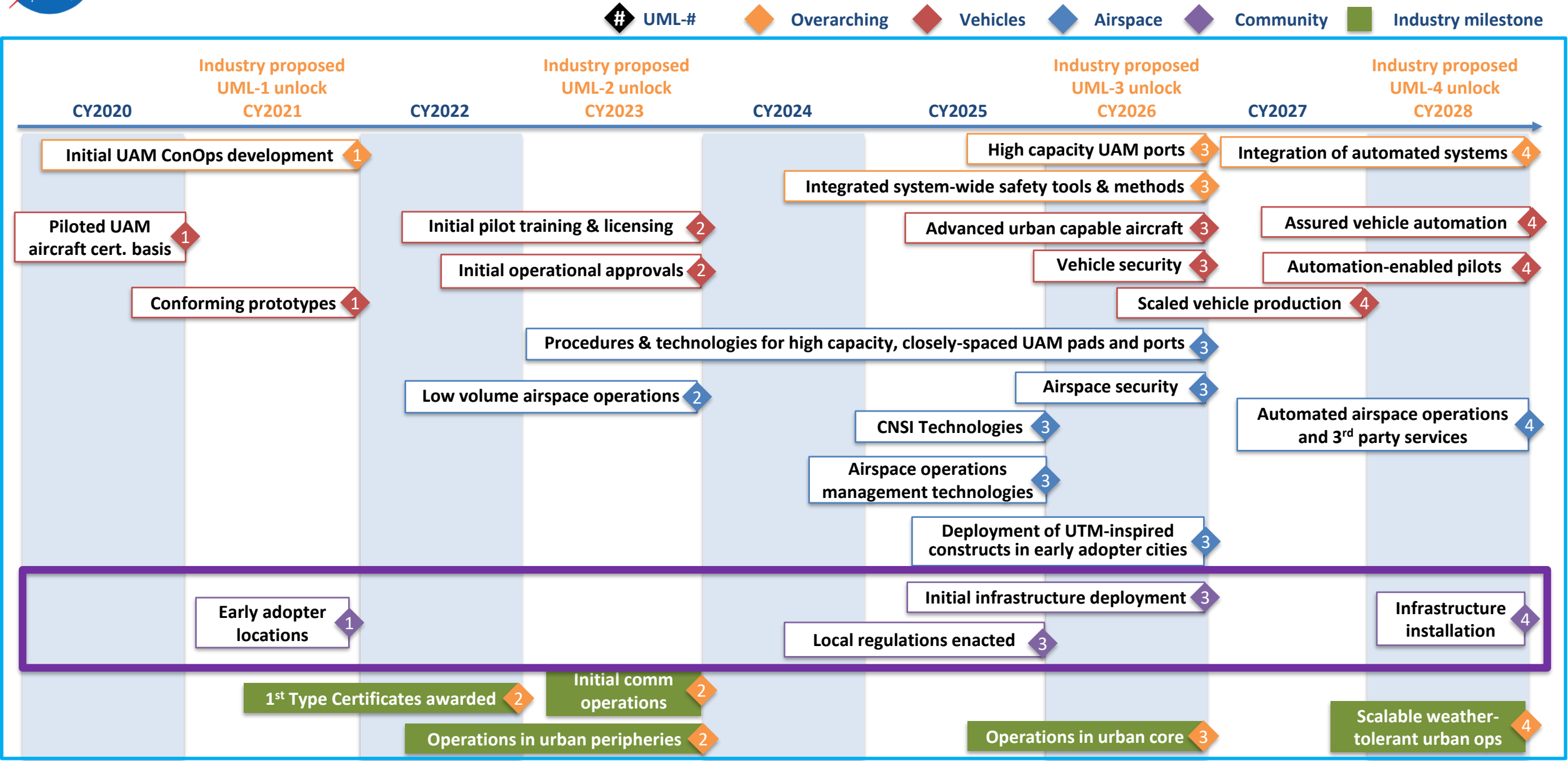


UAM Pillar 5: Community Integration

Category	Pillar	Barrier	Description of Operational Objective that solves barrier
3 Community Integration	5 Community Integration <i>Achieve public acceptance of UAM vehicle operations in and around metropolitan areas by addressing UAM-related social concerns such as safety, security, affordability, noise, privacy, and legality.</i>	Public Acceptance	<ul style="list-style-type: none">• Achieve public acceptance of the UAM concept by overcoming concerns over issues such as safety, non-user risk exposure, security, affordability, effects of increasing autonomy, noise, and privacy as well as a lack of consensus on the public value proposition of UAM.
		Supporting Infrastructure	<ul style="list-style-type: none">• Develop and implement the required supporting infrastructure for integrating UAM operations into metropolitan areas, including UAM Ports, energy infrastructure, and test ranges.
		Operational Integration	<ul style="list-style-type: none">• Implement multi-mode transportation integration and address operations-related community impacts, including passenger/cargo security, protection from malicious use of vehicles and denial of service attacks, and graceful degradation of the transportation ecosystem in reaction to disruption of UAM services.
		Local Regulatory Environment & Liability	<ul style="list-style-type: none">• Enact laws and regulations for governing UAM operations, such as zoning, privacy, and noise, striving for consistency across operating locations (i.e., states, municipalities) and develop a framework for the analysis of liability associated with the development and operation of increasingly automated and autonomous systems.



Representative industry proposed UAM timeline¹ and milestones



¹ Based on a range of publicly available industry projections; not a consensus view; aggressive



Milestone definitions (1/3)

Overarching Vehicles Airspace Community Industry milestone

Milestone	Definition
UML 1	UAM CONOPS development The initial concept of operations for UAM is defined and implemented. The CONOPS is reviewed and revised as needed to suit evolving technology, system needs, and demands
	Piloted UAM certification basis Certification pathways are charted , and associated regulations and standards for the type certification of piloted UAM aircraft are developed
	Conforming prototypes UAM vehicle prototypes are developed that conform to the requirements defined by the piloted UAM certification basis
	Early adopter cities Initial evaluation of the positions of state and local governmental officials and stakeholders and an assessment of public opinion is complete for candidate cities for early UAM adoption
UML 2	Initial pilot training & licensing standards Requirements, standards, and training programs are implemented for piloting UAM vehicles
	Part 135 operator standards Operator standards , similar to those in Part 135 , are implemented for UAM fleet operators and flight service providers
	Low volume flight procedures Procedures and airspace systems are in place to support low volume UAM operations in the urban periphery (e.g., traffic management, weather services, contingency management, etc.)
	1st Type certificates awarded The first type certificate for a piloted UAM aircraft is awarded
	Commercial operations Commercial, passenger carrying UAM operations begin
	Operations in urban periphery Commercial operations in urban peripheries begin



Path forward for WG and Subgroups

Proposed categorization of CIWG efforts

- Informational
 - » Stakeholder identification
 - » Educational information
 - » Community Events – Conferences and Meetings
- Addressing CI barriers
 - » Milestone validation
 - » Existing or planned efforts
 - » Initiating effort(s) to address existing gaps



Stakeholders

Government (Federal)

- NASA
- National Academies-Transportation Research Board
- National Institutes of Standards and Technologies (NIST)/Smart Cities
- National Transportation Safety Board (NTSB)

Incubators/Investors

- Alliance Texas
- Defense Innovation Experimental (DUIx)
- FAA/IPP: Choctaw, San Diego, IEIA (VA), KS DoT, Ft Myers (FL), Memphis Airport (TN), NC DoT, ND DoT, Reno (NV), UAF (Fairbanks, AK), LA DoT, WA DoT
- Starburst
- Strategic Alliances Resources Network (StarNet)
- Sustainable Aviation Limited
- Uber

Associations (Domestic)

- American Association of Airport Executives (AAAE)
- American Insurance Association
- Aircraft Owners and Pilots Assoc (AOPA)
- Community Air Mobility Initiative (CAMI)
- Chambers of Commerce
- Commercial Drone Alliance
- Coalition of UAS Professionals
- Environmental Groups (e.g. Sierra Club)
- Experimental Aircraft Association (EAA)

Community Integration

Local/National

Decision Makers (Local)

- Mayors/City Councils/Boards of Supervisors
- Tribal Councils
- Departments of Transportation
- Departments of Commerce
- National League of Cities (2000+ cities, 49 states with additional cities)
- Port Authority (of various big cities)
- US Conference of Mayors
- National Governors Association

Decision Makers (National)

- US Congress
- DOT/FAA – AIR, AFS, ATO
- DOC/NTIA (public/federal spectrum)
- FCC (commercial spectrum)
- DHS
- DOJ/FBI

National/International

Decision Makers (International)

- US Congress
- DOT/FAA – AIR, AFS, ATO
- DOC/NTIA (public/federal spectrum)
- FCC (commercial spectrum)
- European Aviation Safety Agency (EASA)
- European Organization for Civil Aviation Equipment (EUROCAE) (Europe)

Standards

- American Society for Testing and Materials (ASTM) (I)
- National Fire Protection Association
- Radio Technical Commission for Aeronautics (RTCA) (I)
- Society of Automotive Engineers (SAE) (I)
- International Civil Aviation Organization (ICAO) (I)

Government (Intranational)

- Civilian Aviation Authority (CAA-UK)
- German Aerospace Center (DLR)
- Japan Aerospace Exploration Agency (JAXA)
- Korea Aerospace Research Institute (KARI)
- Netherlands Aerospace Center (NLR)
- ONERA (French Aerospace Center)
- Nordic Network for Electric Aviation (NEA)

Contributors (International)

- International Forum for Aviation Research (IFAR)

Associations (International)

- American Institute of Aeronautics and Astronautics (AIAA)
- Airports Council International (ACI)
- Association of Air Medical Services
- Association for Unmanned Vehicle Systems International (AUUSI)
- Civil Air Navigation Services Organization (CANSO) – ANSP providers
- Environmental (Greenpeace, WWF)
- Eurocontrol (Europe)
- General Aviation Manufacturers Association (GAMA)
- International Air Transport Association (IATA) - Airlines
- International Telecommunication Union (ITU)
- Joint Authorities for Rulemaking on Unmanned Systems (JARUS)
- Vertical Flight Society (AHS)



Education & Informational

Advanced Air Mobility in Rural Areas & Beyond" featuring Anna Dietrich (CAMI) and Darrell Swanson

<https://www.youtube.com/watch?v=-cYnsTN04DY>

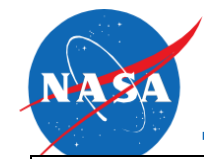
CAMI Resources Library <https://www.communityairmobility.org/resources>

VFS Virtual Workshop on eVTOL Infrastructure

<https://vtol.org/events/virtual-workshop-on-evtol-infrastructure>

ACI-NA Airport Economic Impact Study <https://airportscouncil.org/intelligence/economic-impact-study/>

AAM Ecosystem Working Groups Virtual Meetings <https://nari.arc.nasa.gov/aamecosystem>



Upcoming Conferences & Meetings

	Webinar	Agility Prime Kickoff	US Air Force	4/27 - 5/1	Virtual	N/A		https://agilityprime.com/index.html
	Meeting (External)	ASTM F44 Meetings (28-30) [Note workshop on 4/27 canceled]	ASTM	Virtual 4/28-4/30	Was Prague, now virtual			https://www.astm.org/MEETINGS/filtrex40.cgi?+-P+MAINCOMM+F44+futuremeetings_maincomm.frm
	Conference	Aviation Week MRO America	Aviation Week	Moved to Sept 1-3 (was 4/27-4/30)	Dallas, TX	USA		https://mroamericas.aviationweek.com/en/conference/about-the-conference.html
	Conference	Aviation Week UAM Americas	Aviation Week	CANCELED (was 4/27-4/30)	Dallas, TX	USA	Nancy (speaking)	https://uam.aviationweek.com/en/home.html
	Webinar	Virtual Workshop on eVTOL Infrastructure Part 3 - Acoustics and Noise	VFS	29-Apr	Virtual	N/A		https://vtol.org/events/virtual-workshop-on-evtol-infrastructure
		2020 EUROCAE Symposium	EUROCAE	Canceled (was 4/29-5/1)	Geneva, Switzerland	Switzerland		https://www.eurocae.net/events/eurocae-symposium-2020/#pos_4564
May	Webinar	Virtual Workshop on eVTOL Infrastructure Part 4 - Urban / Municipality Planning & Land Use	VFS	6-May	Virtual	N/A		https://vtol.org/events/virtual-workshop-on-evtol-infrastructure
	Conference	AUVSI XPONENTIAL 2020	AUVSI	Postponed to Aug 10-12	Boston, MA	USA		https://www.xponential.org/xponential2020/public/enter.aspx
	Conference	More Electric Aircraft USA Conference	MEA	Postponed to Sept (was 4/28-4/30)	Washington D.C.	USA		https://www.iqpc.com/events-more-electric-aircraft-usa-d-c/
	Conference	ATCA Tech Symposium	ATCA	Postponed to Dec (was 4/28-4/30)	Atlantic City, NJ	USA		https://www.atca.org/TechSymposium
	Meeting (Internal)	NASA MBSE CoP Meeting and SE Workshop??	NASA	Week of May 18	Near MSFC	USA	??	
	Conference	VFS Forum 76	VFS	Postponed to Oct 6-8 (Was 4/28-4/30)	Montreal, Quebec	Canada	Colin Theodore, ...	https://vtol.org/annual-forum/forum-76
June	Conference	Smart Cities Expo Atlanta	Smart City Expo World Congress	Postponed to TBD dates	Atlanta, GA	USA		https://smartcityexpoatlanta.com/
	Conference	EVS33 (World Electric Vehicle Symposium & Exposition)	Electric Drive Transportation Association	Canceled (was 6/14-6/16)	Portland, OR	USA	?	https://evs33portland.org/
	Conference	AIAA Aviation Forum and Expedition	AIAA	6/14-6/19	Virtual (was Reno, NV)		Michael, Starr, Murphy,...	https://www.aiaa.org/aviation
	Conference	FAA UAS Symposium	AUVSI	6/16-6/19	Baltimore, MD	USA	Davis,...	http://faauas.auvsi.net/faa2020/attend
	Conference	2020 MBSE Cyber Experience Symposium	No Magic	6/21-6/24	Allen, TX	USA		https://mbsecyberexperience2020.com/
	Conference	AC377 Autonomy in Aviation Symposium	ASTM	6/30/2020	Washington, DC (Washington Marriott Wardman Park)	USA		
July	Event	EAA AirVenture	EAA	7/20-7/26	Oshkosh, WI	USA		https://www.eaa.org/en/airventure
August	Conference	AUVSI XPONENTIAL 2020	AUVSI	8/10-8/12 (tentative)	Boston, MA	USA		https://www.xponential.org/xponential2020/public/enter.aspx
	Conference	AIAA/IEEE Electric Aircraft Technologies Symposium (EATS)	AIAA/IEEE	8/26-8/28	New Orleans, LA	USA		https://www.aiaa.org/propulsionenergy/program/eats

Red text shows postponed or cancelled events (due to COVID-19). Green text shows virtual events



Milestone validation



Existing or Planned Efforts

Acoustics Technical and UAM Noise Working Groups (UNWG)

Spring 2020 Meeting <https://evt.grc.nasa.gov/atwg-spr2020/>

Steve Rizzi s.a.rizzi@nasa.gov & Dennis Huff dennis.l.huff@nasa.gov



Community Integration Working Group

NASA Community Integration Working Group Lead:

Nancy Mendonca

Nancy.Mendonca@nasa.gov

Community Integration Working Group Co-lead:

NAME

EMAIL

NASA Aeronautics Research Institute (NARI) Support:

Richard Walsh

Richard.walsh@nasa.gov

NARI AAM PORTAL:

In Work



- Working group
 - Information
- Subgroup
 - Establishing
 - Membership
 - Logistics
- Information
- Next steps
 - Information collation
 - Upcoming Meetings
 - Milestone/Function validation



Community Integration Working Group Calendar of Events 2020

- **May Events**

Community Integration Working Group Kickoff meeting – Today

Aircraft Working Group kickoff meeting - TBD

- **June Events**

UAM Concept of Operations (ConOps) Overview – June 25th 1:30-3:00 EDT

ConOps, Aircraft Pillars – June 26th 1:30-3:00 EDT

Con Ops, Airspace Pillars – TBD

ConOps, Community Pillar – July 10th, 1:00-2:30 EDT

Airspace Working Group Kickoff meeting - TBD



Community Integration FAQs



Panel Participants



Rex Alexander
President
Five-Alpha



Anna Mracek Dietrich
Co-Executive Director
Community Air
Mobility Initiative



Chris Oswald
Senior Vice-President
Airports Council -
International



Shawn Bullard
President
Duetto Group



Chris Hewlett
Specialist Leader
Deloitte Consulting



Basil Yap
UAS Program
Manager
NC DOT



Panel Questions

- From your perspective, can you highlight a critical community need?
- What do you see as some of the primary community integration barriers?
- Can you give an overview of a current effort working to solve a community integration barrier?
- What are your thoughts around building on the great work done by VFS, CAMI, Smart Cities and other community members?
- How do you see this group providing benefit to the community?
- How would you define “community” and or “ecosystem” in the context of the NASA Advanced Air Mobility initiative?

Upcoming Events

- **May Events**

Aircraft Working Group Kickoff meeting - TBD

- **June Events**

UAM Concept of Operations (ConOps) Overview – June 25th 1:30-3:00 EDT

ConOps, Aircraft Pillars – June 26th 1:30-3:00 EDT

Con Ops, Airspace Pillars – TBD

ConOps, Community Pillar – July 10th, 1:00-2:30 EDT

Airspace Working Group Kickoff meeting - TBD



Back-Up



Milestone definitions (2/3)

Overarching Vehicles Airspace Community Industry milestone

Milestone

Definition

UML 3	Airspace security standards	Policy, standards, and best practices are developed for physical and cybersecurity relating to UAM airspace technologies and systems (e.g., CNS, traffic management)
	Procedures for high capacity, closely spaced UAM ports/pads	Procedures for high volume UAM operations with high capacity, closely spaced UAM ports and pads are implemented
	Airspace Technologies	Technologies for safe UAM airspace operations (e.g., communication, navigation, command and control, surveillance) are developed and approved for operation use
	Vehicle security standards	Policy, standards, and best practices are developed for physical and cybersecurity relating to operational UAM vehicles
	Advanced urban capable aircraft	Certified next generation aircraft are developed with capabilities suitable for advanced urban operations. These include low noise, weather tolerance, quick aircraft turn around time, and suitable battery energy density
	Initial Infrastructure deployment	First purpose built UAM infrastructure installations are completed and operational
	Local regulations enacted	Local regulations developed by early adopter cities are being broadly adopted
	Operations in urban core	Commercial operations in urban core areas have begun (i.e., central downtown)



Milestone definitions (3/3)

Overarching Vehicles Airspace Community Industry milestone

Milestone	Definition
UML 4	Autonomous system integration Standards and best practices are developed for the integration of autonomous airspace and vehicle technologies into a unified air transport operations system
	Standards and policy Overarching standards and policies to govern the development, testing, and operations of UAM vehicles, technologies, and systems are developed
	Training and standards for simplified operations Requirements, standards, and training programs are developed and implemented for simplified flight operations and remotely piloted UAM vehicles
	Assured vehicle autonomy Systems and technologies that enable autonomous vehicle operations and take into account heterogeneous vehicle operations are developed and approved for operational use
	Scaled vehicle production The manufacturing of UAM vehicles has reached a point of critical scalability and vehicles are cost effective for fleet operators
	Deployment of UTM-inspired constructs in early adopter cities UAM airspace systems and technologies are widely deployed in early adopter cities and support medium density operations , serving as a model and guide for future adopter cities
	Autonomous airspace operations and 3rd party services Government and 3rd party technology and systems that enable smooth autonomous airspace operations (e.g., surveillance, ATC, weather, NOTAMS, flight planning, etc.) are developed and approved for operational use
	Infrastructure installation UAM ports/pads and supporting infrastructure are widely deployed and capable of supporting scaled UAM operations
	1st V&V of responsible automated systems First fully-autonomous UAM vehicle and airspace systems are validated and verified for reliable and responsible operation



Nancy Mendonca, is currently the NASA ARMD portfolio manager overseeing the formulation of new projects within ARMD and a member of the ARMD headquarters office responsible for strategic analysis and resource management. She served 24 years in the Navy flying H-46 helicopters. Between the Navy and NASA she worked at the Missile Defense Agency, on the Marine Corps MRAP Program and at NTIA working on the Federal Strategic Spectrum Plan. She graduated from the U.S. Naval Academy with a B.S. in Aeronautical Engineering and subsequently earned M.S. degrees in Aeronautical Engineering and National Security and Strategic Studies. She is also a Certified Public Accountant and has currently prioritized rescuing Great Danes and riding horses over flying helicopters.

